1964

MISSISSIPPI

WATERSHED WORK PLAN

TUSCUMBIA WATERSHED

ALCORN AND PRENTISS COUNTIES, MISSISSIPPI
AND
MCNAIRY COUNTY, TENNESSEE

JUNE 1964


United States
Department of
Agriculture
National Agricultural Library

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ALCORN AND PRENTISS COUNTIES, MISSISSIPPI

AND

MCNAIRY COUNTY, TENNESSEE

Prepared under the Authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress; 68 Stat. 666) as amended.

Prepared by:

Tuscumbia Drainage District of Alcorn and Prentiss Counties, Mississippi
Northeast Mississippi Soil Conservation District
Tuscumbia River Watershed District (Tennessee)
McNairy County Soil Conservation District (Tennessee)

With Assistance by:

U. S. Department of Agriculture, Soil Conservation Service
U. S. Department of Agriculture, Forest Service

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Alcorn and Prentiss Counties, Mississippi
and
McNairy County, Tennessee

June 1964

SUMMARY OF PLAN

Tuscumbia Watershed contains 223,146 acres or 348.7 square miles and is located in the northeastern part of Mississippi with a small portion (6 percent) extending into the southwest corner of McNairy County, Tennessee.

The sponsoring local organizations are the Tuscumbia Drainage District of Alcorn and Prentiss Counties, Mississippi, the Tuscumbia River Watershed District of Tennessee, the Northeast Mississippi and the McNairy County Soil Conservation Districts.

Existing conditions have resulted in (1) floodwater damages to crops and pastures, fixed improvements, and industrial and urban areas, (2) severe to moderate erosion in the upland areas, (3) difficulty in establishing and maintaining open ditches to remove floodwater from the low flat areas of the flood plain, and (4) minor sediment and scour damage to flood plain land.

These problems will be reduced to such extent as is physically possible and economically feasible by establishing land treatment measures, by constructing floodwater retarding structures, stream channel improvements, installing water flow control devices, and other measures necessary to solve the watershed problems.

The application of the proposed works of improvements will accomplish the following: (1) erosion damage to roadsides and upland soils will be greatly reduced, (2) flood plain lands now in agricultural use can be maintained in a productive condition and be subject to less frequent floodwater and sediment damages, (3) productive flood plain land will be restored to former use and enhanced for the production of crops and pasture, and (4) provide some additional recreational facilities.

Approximately 2,343 farms (727 farms in flood plain), numerous homes, businesses, streets, roads, and bridges will be benefited by the project. Of the 35,465 acres in the flood plain, 34,237 acres will receive flood reduction benefits.

The works of improvement will be installed over a 10-year period at an estimated total cost of $7,686,766, of which $4,710,602 or about 61 percent

will be financed from P.L. 566 funds and $2,976,164 or about 39 percent will be financed from Other funds (Table 1).

Hunting, fishing, and recreational activities will be provided throughout the watershed by utilizing the farm ponds, wildlife area plantings, and odd corners of fields, field borders among woods, and timber stand improvement to utilize hardwoods for increased small game habitat. Eight existing wildlife habitat areas will be maintained for duck hunting. The existing oxbow and natural lakes, including Dismal Swamp, and old river runs in the lower reach adjacent to the main channel will be maintained in their present condition for fishing.

Land treatment measures will be installed by the farmers through conservation farm plans in cooperation with the Northeast Mississippi Soil Conservation District and the McNairy County Soil Conservation District of Tennessee. These measures will be installed at an estimated total cost of $2,821,278, of which $558,604 or about 20 percent will be financed from P.L. 566 funds and $2,262,674 or about 80 percent will be financed from Other funds.

Structural measures in Mississippi will be installed by contract by the Tuscumbia Drainage District of Alcorn and Prentiss Counties. Structural measures in Tennessee will be installed by contract by the Tuscumbia River Watershed District.

Twenty-two floodwater retarding structures will be installed at an estimated total cost of $2,676,773, of which $2,132,453 or about 80 percent will be financed from P.L. 566 funds and $544,320 or about 20 percent from Other funds.

Stream channel improvements (130.53 miles) will be installed at an estimated total cost of $2,188,715, of which $2,019,545 or about 92 percent will be financed from P.L. 566 funds and $169,170 or about 8 percent from Other funds.

Small levees or dikes and nine water flow control gates will be installed as mitigating measures to protect the existing eight wildlife areas as shown on the Project Map. The cost of installing these measures is estimated to be $13,750 and will be financed from P.L. 566 funds.

Land treatment measures will be operated and maintained by individual farmers with assistance from their respective Soil Conservation Districts.

Floodwater retarding structures, channels, and wildlife areas in Mississippi will be operated and maintained by the Tuscumbia Drainage District of Alcorn and Prentiss Counties. Channels and wildlife areas in Tennessee will be operated and maintained by the Tuscumbia River Watershed District. The average annual cost for operation and maintenance of structural measures is estimated to be $23,077.

The total average annual costs of structural measures are estimated to be $177,070. The total average annual benefits are estimated to be $366,556. The benefit-cost ratio is estimated to be 2.1 to 1.0, Table 6.

DESCRIPTION OF THE WATERSHED

Physical Data

Location

Tuscumbia Watershed lies in northeast Mississippi and south central Tennessee with 74 percent or 164,816 acres in Alcorn County; 20 percent or 44,896 acres in Prentiss County; and 6 percent or 13,434 acres in McNairy County. The watershed is in the upper reaches of the Hatchie River Basin. Tuscumbia River flows in a northerly direction through the watershed to its confluence with Cypress Creek in Tennessee; thence, in a northwesterly direction to its junction with Hatchie River in Tennessee. Corinth, the county seat of Alcorn County, is the largest city in the watershed and is located 92 miles east of Memphis, Tennessee; 50 miles north of Tupelo, Mississippi; and 55 miles west of Florence, Alabama.

Land

The Tuscumbia Watershed lies within the Gulf Coastal Plain physiographic province and contains parts of three topographic divisions, from west to east: the Pontotoc Hills, Black Prairies, and the Tombigbee and Tennessee River Hills.

The Pontotoc Hills is a rugged to rolling upland of moderate to high relief along the western rim of the watershed. It consists of the sandy beds of the Ripley formation (Cretaceous) and the outlet end of the watershed has cut into the McNairy sand member (Cretaceous) of the Ripley formation.

East of the Pontotoc Hills, in the center section of the watershed, is a district of subdued topography known as the Black Prairies. This area is underlain mainly by the Demopolis chalk (Cretaceous) and ranges from nearly level plains to low broadly rounded hills.

The hilly area in the eastern section of the watershed lies in the Tombigbee and Tennessee River Hills. This area is underlain by the Coffee Sand formation (Upper Cretaceous) which is a westward sloping hilly upland whose general surface is irregular.

The soils in the flood plains are in three resource areas: Coastal Plain, thin Loess, and Blackland Prairie. Soils in the Coastal Plain Resource Area are Iuka, Mantachie, and Bibb. These soils are moderately well to poorly drained. The rate of infiltration and internal water movement is moderate to slow. The natural fertility of the Iuka, Mantachie, and Bibb is moderate. The soils are easy to work and are adapted to locally grown crops. They are productive when properly drained and protected from floodwater damage.

Soils in the thin loess are Collins, Falaya, and Waverly. These soils are moderately well to poorly drained. The rate of infiltration and internal water movement is moderate to slow. The natural fertility of Collins and Falaya is moderate and low for Waverly. The soils are easy to work and adapted to locally grown crops. These soils are productive when properly drained and protected from floodwater damage.

The Blackland Prairie soils are Catalpa, Leeper, and Houlka. The Catalpa is moderately well drained and the Leeper and Houlka are somewhat poorly drained. The infiltration rate and internal water movement is slow. The natural fertility is moderate. Due to the high clay content, these soils are difficult to work and are often wet late in the spring. They are productive when properly drained and protected from floodwater damage. They are adapted to locally grown crops and grasses.

The upland soils are in two resource areas: the thin Loess and Coastal Plain. The principal soils of the thin Loess resource area are Dulac, Providence, Tippah,and Bude. These soils are all moderately well drained except the somewhat poorly drained Bude. These soils are formed from thin loess overlying Coastal Plain materials. The Dulac, Providence, and Bude have a fragipan at about 16 to 22 inches. The Tippah does not have a fragipan but overlies clay. The rate of infiltration is slow and internal water movement is moderate above the fragipan and slow in the pan layer. All these soils are adapted to locally grown crops, grasses, and pine trees. When properly managed, they are high in production. The principal soils of the Coastal Plain are Ruston, Ora, and Cuthbert. These soils are well drained to moderately well drained. The Ora soil has a fragipan at about 18 to 22 inches. The infiltration rate and internal water movement is slow in the Ora and Cuthbert and moderate in the Ruston. These soils are adapted to locally grown crops, grasses, and pine trees. When properly managed, they are moderate to high in production.

The principal terrace soils are of one resource area: the mixed Loess and Coastal Plain. These soils are Freeland, Hatchie, and Almo. These soils range from moderately well to poorly drained. These soils have fragipans at about 16 to 22 inches. The rate of infiltration is moderate to slow and internal water movement is slow in the fragipans. These soils are adapted to locally grown crops and grasses. When properly managed, they are high in production.

The topography ranges from flat or almost level in the bottomland to gently rolling to steep along the western and eastern rim of the watershed boundary. The main valleys average about 3,000 feet in width. The elevation above mean sea level ranges from 364 feet at the lower end near Pocahontas, Tennessee, to about 640 feet along the western rim of the watershed near Hightown, Mississippi.

Present land use of the watershed is about 31 percent cropland, 13 percent pasture and perennials, 44 percent woodland, and 12 percent miscellaneous and idle land.

Vegetative cover is generally poor to fair. Sheet erosion is moderate throughout the upland areas. Erosion is active on 127 miles (one side) of roadbanks, and severe erosion is active on 12,275 acres. The hydrologic cover condition of the pastures is 13 percent good, 20 percent fair, and 67 percent poor. The hydrologic cover condition of the miscellaneous and idle land is 18 percent good, 22 percent fair, and 60 percent poor.

The present hydrologic condition of the upland forest soils is rated as 38 percent poor and 62 percent very poor. Forty-eight percent of the forest land has been in cultivation or pasture within the past fifty years. Four percent of the forest soil has been damaged by improper logging methods. Fifteen percent of the forest soil is being damaged by domestic grazing. The damage is 11 percent light, 2 percent moderate, and 2 percent severe.

Twenty-five percent of the forest and its soil has been damaged by fires which have occurred within the past 15 years. The damage is classified as 7 percent light and 1 percent moderate.

Water

Tuscumbia River rises in the town of Booneville, Mississippi, and flows in a northerly direction for approximately 18 miles; thence, in a northwesterly direction for approximately 19 miles to its confluence with Cypress Creek in Tennessee; then continues in a northwesterly direction for approximately 5 miles to its confluence with Hatchie River.

Generally, there has been sufficient moisture to produce crops. At present there are no irrigation systems nor are there any planned for this watershed. Water sources are considered adequate for water needs.

Water for domestic use is supplied from drilled wells, dug wells, and springs. Livestock water is obtained from drilled wells, farm ponds, lakes, and perennial streams. There is no indication of a shortage in the ground water supply.

Tuscumbia River is a perennial stream and along with some of the old meander runs in the lower reaches affords some natural habitat for fish and ducks. These areas are generally open to the public. There are a number of small lakes scattered throughout the watershed limited to private ownership. There is one neighboring stream, Tennessee River (Pickwick Lake), 25 miles east of Corinth available for public fishing and recreation.

Climate

Based on the 1962 Annual Summary at Corinth, Mississippi, the average annual precipitation is 52.15 inches. About 30.36 inches of precipitation occurs during the crop growing season of April through November. The wettest month is January with an average of 6.23 inches and the driest month is October with an average of 2.77 inches.

The average annual temperature is 62.7 degrees Fahrenheit. January is the coldest month with an average temperature of 43.2 degrees and July is the hottest month with an average temperature of 81.7 degrees.

The length of the growing season is about 223 days between the last killing frost in March and the first killing frost in November.

Fish and Wildlife Resources

The entire watershed area is generally good wildlife habitat. Farm game (bobwhite quail and rabbits) are plentiful in the upland areas. The bottomland in the lower reach along Main Tuscumbia channel provides good duck habitat. Several natural lakes formed by old river "runs" are present in these bottoms. These lakes provide resting and roosting areas for ducks. Acorns and other natural foods are made available to ducks when water floods intermittently through the winter on these areas. These lakes are good fishing areas for local residents. The Tuscumbia River is fished by local residents but does not provide the quality of fishing found in the natural lakes. The Tuscumbia River does provide spawning areas for several species of game fish which repopulates the natural lakes in time of overflow.

Economic Data

The major farm enterprise within the watershed is cotton production with corn and soybeans grown in rotation. Other important farming activities consist of the production of dairy products and beef cattle. Forestry products are produced in medium quantities.

There are approximately 2,343 farms within the watershed with an average size of 93 acres. The estimated average value of land and buildings per farm is approximately $8,000. Farms vary in size from 5 acres to 1,000 acres and are predominantly owner-operated. There is no public-owned land within the watershed.

The following table shows farm income for Alcorn and Prentiss Counties, Mississippi, and McNairy County, Tennessee, by farm income groups:

	Mississippi		Tennessee
	Alcorn County	Prentiss County	McNairy County
Total farms	1,876	2,043	1,857
Farms by Economic Class:			
Commercial $2,500 and over	990	1,186	1,138
Class I, $40,000 and over	0	10	0
Class II, $20,000 - $39,999	5	10	6
Class III, $10,000 - $19,999	42	58	40
Class IV, $5,000 - $9,999	95	110	147
Class V, $2,500 - $4,999	331	437	440
Class VI, $50 - $2,499	517	561	505
Part time, $50 - $2,499	651	645	438
Part retirement, $50 - $2,499	235	212	281
Percent Class VI of Commercial	52	47	44
All farm products sold average per farm (1959)	$1,957	$2,447	$2,551

Numerous county roads, state highways 2, 4, 30 and 356; U. S. Highways 45 and 72; the Gulf, Mobile and Ohio, the Southern, and the Illinois Central Railroads provide easy access to nearby markets and business areas. The town of Booneville is located on the extreme southern boundary of the watershed and the City of Corinth is located in the north central part of the watershed. Other villages in the watershed are Rienzi, Kossuth, and Biggersville.

Land Treatment Data

All land in the watershed is in the Northeast Mississippi and McNairy County, Tennessee, Soil Conservation Districts. Of the 2,343 farms in the watershed, 1,131 have conservation farm plans written. About 48 percent of the planned practices have been established.

The two Soil Conservation Districts have assisted landowners and farmers in establishing land treatment measures such as pasture planting, tree planting, stock watering ponds, diversion construction, terracing, grassed waterways, and surface field ditches.

WATERSHED PROBLEMS

Floodwater Damage

There are 35,465 acres of flood plain land in the watershed and has a current average value of $100 per acre. Floodwater damage includes damages to fixed improvements such as fences, field ditches, county, state and Federal roads and bridges, railroad bridges,and urban damage in the City of Corinth.

Damaging floods occur on the flood plain land along the main streams on an average of from 3 to 8 times per year. Floods occur during the crop growing season on an average of from 2 to 7 times per year. This flooding has caused considerable acreage of the flood plain land to be abandoned from cultivation. Flooding on the tributaries ranges from 1 to 5 damaging floods per year with an average of from 1 to 4 during the crop growing season. The land use and yields on the tributaries vary in accordance with the frequency of damaging floods.

Frequent spring and summer floods delay land preparation and planting. Floods that occur after normal planting time make repreparation and replanting necessary. As a result, uneven stands are obtained, increased cost of production is incurred and reduced crop yields result.

The soils of the flooded areas are predominantly in land capability classes IIw, 53 percent; IIIw, 17 percent; and IVw, 30 percent. The flood plain areas would be used largely for cultivated crops and improved pastures if it were not for the existing flood hazard.

Flooding has caused damages to roads and bridges throughout the flood plain. The greater damages to the fixed improvements are caused by the larger floods. There has been no recent loss of life as a direct result of flooding.

The estimated average annual damage to crops and pastures is $453,882, non-agricultural damages amount to $38,685, and indirect damages amount to $49,257, Table 5.

Sediment and Erosion Damages

Roadside erosion and erosion in the upland areas have resulted in moderate to severe siltation in most of the stream channels. Sediment has caused channel fill and was evaluated with floodwater damages as channel fill increased frequency of flooding in the affected areas. Sediment damages are minor on flood plain land and were not evaluated monetarily.

There are approximately 154,441 acres of class IIe, IIIe, IVe, VIe, and VIIe land in the watershed. Of this total, 35,304 acres are in cultivation, 19,393 acres idle, 23,592 acres pasture and perennials, and 76,152 acres in woods. Sheet erosion is moderate to severe on this land and gully erosion is active on 12,275 acres. Bare roadbanks along 127 miles (one side) of roads are eroding and have caused filling of channels, road ditches, and culverts.

The present sediment yield at the junction of Cypress Creek is estimated to be 433,552 tons per year.

Some scour damage occurs on the flood plain as a result of the frequency of overflows. However, it is limited in scope, does not hinder cultivation, and was not evaluated.

Problems Relating to Water Management

Some channel improvement work has been completed and provides sufficient capacity to meet the drainage needs for the areas they serve. There are no highwater tables or seepage problems. The efforts of the local people through individual on-farm land treatment and through individual and group conservation engineering practices have not been sufficient to solve the floodwater and sediment problem.

Non-agricultural water supply is not a problem. There is a need for additional farm ponds to facilitate better management of pastures. Irrigation is not a problem. Adequate moisture for the production of crops commonly grown in the area is available from normal rainfall. No project action is needed at this time to provide additional sources of water for irrigation.

There is a need in the watershed for additional fish and wildlife facilities for the general public. The only fishing and wildlife facilities available are private ponds and lakes and the old runs adjacent to the main stream. The only public fishing and wildlife facilities are at Pickwick Lake some 25 miles northeast of Corinth, Mississippi.

PROJECTS OF OTHER AGENCIES

There have been 14 organized drainage districts in this watershed. Ten of these districts are dormant, one has been dissolved, one is inactive and

two are still active, maintenance only. The districts constructed a total of 83 miles of drainage ditches. Partial flood protection was provided by these districts; but due to the ditch designs at that time, they have proven inadequate for current flood prevention needs. Due to 12 of the 14 districts being inactive, maintenance has generally been performed on a scattered basis and has been inadequate. There are no other planned works of improvement by other agencies for water resource development.

The Mississippi Forestry Commission and the Tennessee Division of Forestry, in cooperation with the U. S. Forest Service, are furnishing forest fire protection in this watershed. This protection is provided under Section 2 of the Clarke-McNary Program.

Technical management assistance is furnished by the Mississippi Forestry Commission and the Tennessee Division of Forestry in cooperation with the U. S. Forest Service. This service is a part of the Cooperative Forest Management Act.

BASIS FOR PROJECT FORMULATION

The objectives of the local people are to (1) reduce the frequency and duration of flooding on the Tuscumbia flood plain and its tributaries to the extent that about 75 percent of the flood plain land benefited by structures can be used intensively for the production of crops and pastures, (2) restore potentially productive land subject to frequent flooding to former use for the production of crops, (3) adequately protect open cropland from floods for sustained agricultural use by the installation of adequate outlets for on-farm ditches, (4) establish more adequate vegetative cover through better use of conservation cropping systems and to vegetate and control critical sediment producing areas in the uplands, (5) maintain the eight existing wildlife habitat areas for duck hunting, and (6) maintain the existing oxbow and natural lakes and old river runs in their present condition for fishing.

In order to meet the desires and objectives of the local people and with emphasis on floodwater storage, sites were investigated for 43 floodwater retarding structures. Due to the topography, small drainage area of structures, anticipated high cost of easements, and high cost per acre benefited, 21 floodwater retarding structure sites were eliminated. The 22 sites selected were the most feasible sites and provided an acceptible degree of protection. Eleven of the floodwater retarding structures were planned with single-stage principal spillways and 11 were planned with two stage principal spillways. These structures were so planned to assure a high level of flood protection for the more frequent events. This permits a smaller channel to be used to meet project objectives. The capacity of the high-stage of the two-stage principal spillway permits more efficient structure design, utilizing the full capacity of the conduit through the dam for discharge of runoff waters from the less frequent storms.

The floodwater retarding structures are supplemented by 130.53 miles of channel improvements. The degree of flood protection which these floodwater retarding structures and channels will provide is the maximum feasible at this time and the protection provided will be adequate for the crops to be grown in the benefited area. From Station 1232 + 50 (5,350 feet north of

U. S. Highway 72) to the junction with Hatchie River, the design depth and width of the proposed main channel were held constant and the present channel alignment will be followed. From the junction of Cypress Creek to the junction with Hatchie River, the primary channel improvement work will consist of clearing and snagging with a minimum of channel excavation. The channel improvement work through this area was designed to permit the existing dedicated woodland through this area to periodically overflow during the winter months, thereby maintaining conditions favorable for ducks. Also, this periodic overflow will tend to keep the natural lakes along the river bottom in fairly good fishing condition. The open lands in this area will be protected from damaging floods of approximately a three-year frequency during the crop growing season. The local sponsors understand and are wholly satisfied with the level of protection afforded by these measures.

The land treatment measures included in this plan are those measures that will contribute measurably to meeting the objectives and desires of the local sponsors.

WORKS OF IMPROVEMENT TO BE INSTALLED

Land Treatment Measures

An effective conservation program, based upon the use of each acre of agricultural land within its capabilities and treatment in accordance with its needs, is necessary for a sound flood prevention and agricultural water management program. Land treatment measures were considered the basic element in formulating the watershed project and are essential if it is to function successfully. They are to be planned and applied by individual farmers in cooperation with their respective Soil Conservation District consistent with the objectives of the Soil Conservation Districts and this plan. The amounts and estimated costs of the land treatment measures scheduled for installation are shown in Table 1.

The measures for the planned cropland consist of terraces, contour farming, row arrangement, land smoothing, grassed waterways, conservation cropping systems, cover crops, crop residue use, surface field ditches, diversions, and mains and laterals. The measures for the planned grassland (pastures) consist of pasture planting, hayland planting, pasture and hayland renovation, farm ponds, proper pasture use, pasture mowing, surface field ditches, mains and laterals, and diversions. The measures for the planned woodland consist of tree planting, hydrologic stand improvement, and cooperative forest fire control. For the planned critical area treatment, these measures consist of planting trees, grasses and legumes, debris basins, and roadside erosion control.

Conservation cropping systems and cover crops will assure that high residue producing and soil conditioning crops are grown periodically on the cultivated land. This will increase the infiltration rate of the soils, increase available moisture holding capacities and reduce runoff and sheet erosion.

Terraces, contour farming, row arrangement, land smoothing, grasses waterways, and diversions will provide a means of controlled disposal of excess surface water from the upland areas. This will reduce both sheet and gully erosion.

Row arrangement, land smoothing, grassed waterways, surface field ditches, and mains and laterals will provide a means of adequate disposal of excess surface water from the flood plain. These are necessary to assure the full realization of benefits made possible by the reduction in frequency in flooding and used in the justification of the structural measures proposed for installation under the Act.

Pasture planting, pasture renovation, pasture mowing, and proper pasture use will be on idle acres, established pastures, and other land which should be in a perennial cover for sustained agricultural production. Trees will be planted on similar land which is more suitable for tree production. This land use adjustment will reduce runoff and erosion from the affected areas and will protect them from being destroyed for future agricultural use.

Farm ponds will be located so as to facilitate more uniform distribution of grazing and thus permit management which will provide the most effective grass cover for runoff and sediment control.

Improved hydrologic cover conditions will result from controlled grazing of woodlands, cooperative forest fire control, and other management practices which are necessary to the development of good forest soil conditions. This will result in increased infiltration rates and moisture holding capacities of these soils and reduce runoff, sheet, and gully erosion.

Forest fire suppression for private forestlands in Mississippi will be intensified by installing two slip-on tanker units, two bulldozer blades, and replacing a light class unit with a medium class unit. The medium class unit will consist of a radio-equipped truck, tractor with blade, and plow.

Tree planting and roadside erosion control will stabilize critical runoff and sediment producing areas. These measures will provide protective cover for the critical areas, reduce the rate of erosion, reduce the production of sediment and will reduce the amount of runoff. Debris basins will retard the movement of damaging sediment from critical sediment producing areas until vegetative treatment (tree planting and roadside erosion control) has stabilized these areas.

Food and cover for wildlife will be provided as part of the land use and land treatment program of the watershed. The Northeast Mississippi and the McNairy County, Tennessee, Soil Conservation Districts will assist the landowners and operators in developing individual conservation farm plans. They will provide technical assistance in planning for and carrying out measures and practices on a total of 3,238 acres that will improve the wildlife food and cover for these farms. These measures and practices will also include management of an additional 1,896 acres of water in the floodwater retarding structures for fish and ducks.

Idle land consisting of 6,050 acres remaining on farms will be managed by disking, mowing, or controlled burning to retard undesirable vegetation and encourage native food and cover plants. Natural food and cover areas will be renovated and wildlife food plantings established along field borders and field corners in open areas and woodlands. These measures will provide cover and food for farm game species, particularly, rabbit, bobwhite quail, and mourning dove.

A timber management program, which favors woodland wildlife species, will be followed. All hardwood soil sites, including small hollows and draws, will be maintained in hardwood timber. These sites will be managed so that a variety of hardwood species will be present. The critical areas on which trees are planted are primarily pine sites and would be unsuited to hardwoods. Such sites for tree planting vary in size from 4 to 50 acres. Hardwood sites that are already growing hardwood species are interspaced over the wooded part of the watershed. These areas will produce the foods necessary for woodland wildlife species.

The estimated total cost of installing these measures is $2,821,278, Table 1.

Structural Measures

Floodwater Retarding Structures

Twenty-two floodwater retarding structures are planned for the control of damaging water flow and sediment as shown on the Project Map, Figure 4, page 51. The estimated cost for installing these structures is $2,676,773, Table 2. They will provide 29,310 acre-feet of floodwater detention capacity. This is the equivalent of 5.58 inches of runoff from their combined drainage area of 98.42 square miles or 1.58 inches of runoff from the entire watershed. They will impound in detention storage from 4.48 inches to 7.34 inches of runoff from their respective drainage areas which total 28.2 percent of the watershed, Table 3.

A water level control device, a vertical sliding gate with a two- to three-foot range of operation, will be installed in floodwater retarding structures 8, 16, 19, 20, 24, 25, 28, 30, 38, 39 and 40. These gates will be incorporated into the structure design. The purpose of the vertical sliding gate is for water level manipulation for management of fish population. It may also be used to control pest plants, mosquito breeding, and for planting suitable vegetation for wildlife food.

The 22 floodwater retarding structures were designed for 100-year sediment storage accumulation. The height of the principal spillway was set at the elevation of the 50-year sediment storage pool with 50-years of the sediment storage being aerated. This created unsatisfactory impoundment (depth) of water in structures 13, 18, 28, and 32. In order to mitigate the undesirable conditions, the depths were increased in these four structures at the request of the watershed sponsors and approved by the State Conservationist.

A floodwater retarding structure is a compacted homogeneous earth fill dam having a fixed draw-down tube and an emergency spillway. Its primary purpose is to detain runoff, dewatering its detention or flood pool at a predetermined rate through the draw-down tube (principal spillway), thereby reducing the peak flood flows through the flood plain area downstream. Suitable vegetation is established on the embankment, emergency spillway, and exposed borrow areas to protect them from erosion.

A typical section of a floodwater retarding structure is shown in Figure 1, page 48. Design data for the 22 floodwater retarding structures are shown on Table 3.

Flood Prevention Channels

There will be 130.53 miles of flood prevention channels improved under the provisions of Public Law 566 at a total installation cost of $2,188,715, which includes cost of installing pipe overfall structures, bridge alterations, wildlife mitigation, and the planting of kudzu along the channel banks through open land areas.

The purpose of channel improvement is to provide additional capacity for disposing of controlled flow from the floodwater retarding structures and the runoff from the uncontrolled portion of the watershed. These improved channels will supplement the floodwater retarding structures and will further reduce flood stages, frequency of flooding, and flood plain area inundated. They will reduce floodwater damage and will permit improvement of growing conditions in the flood plain. Design data, channel capacity, and other pertinent data for channel improvements are shown in Table 3A.

An illustration of a typical channel section is shown in Figure 2, page 49. The Project Map, Figure 4, page 51, shows the location of the measures with respect to the watershed.

EXPLANATION OF INSTALLATION COSTS

Land Treatment Measures

Land treatment measures will be installed at an estimated total cost of $2,821,278, of which $558,604 or about 20 percent will be financed from P.L. 566 funds and $2,262,674 or about 80 percent will be financed from Other Funds, Table 1.

The cost of intensified fire control will be shared on a 50-50 basis by the Mississippi Forestry Commission and P.L. 566 funds. The funds provided by the Mississippi Forestry Commission will not include Clarke-McNairy, section 2 matching funds. The entire cost of the tanker units and bulldozer blades will be cost-shared. Only the difference in cost required to replace the light unit with a medium class suppression unit will be cost-shared with P.L. 566 funds.

The P.L. 566 funds are for additional technical assistance to accelerate the land treatment program, for cost-sharing on installation of critical area plantings, and for cost-sharing on roadside erosion control. The Other funds costs are for installing the land treatment measures, technical assistance, and for cost-sharing on the installation of the critical area plantings. The technical assistance for installing the woodland measures will be furnished by the Mississippi Forestry Commission and the Tennessee Division of Forestry in cooperation with the U. S. Forest Service. The technical assistance for the other land treatment measures will be furnished by the Soil Conservation Service and other agencies under other going programs.

The P.L. 566 technical assistance costs will be used to provide for the preparation of 600 new conservation farm plans and for revising 600 old conservation farm plans, planning, establishing, and maintaining 10,614 acres of conservation cropping systems, 13,741 acres of pasture planting, 6,700 acres of pasture and hayland renovation, 9,873 acres of tree planting, 82 miles of

diversion construction, construction of 239 farm ponds, 68 miles of terracing, 114 acres of grassed waterways, 80 miles of mains and laterals, 168 miles of surface field ditches, 13,635 acres of contour farming, 19,766 acres of pasture mowing and proper pasture use, 9,000 acres of row arrangement, 1,200 acres of land smoothing, 71 overfall pipe grade stabilization structures, and 3,238 acres of wildlife food plantings, habitat development and preservation.

The unit costs for establishing land treatment measures are based on current values in this area. The basis for the cost-sharing on critical area land treatment measures was based on the current cost-sharing rate for establishing similar measures under the Agricultural Conservation Programs in Alcorn and Prentiss Counties, Mississippi, and McNairy County, Tennessee.

Structural Measures

Floodwater Retarding Structures

The 22 floodwater retarding structures are to be installed at a total installation cost of $2,676,773, Table 2, of which $2,132,453 or about 80 percent will be financed from P.L. 566 funds, and $544,320 or about 20 percent will be financed from Other funds, Table 2.

The P.L. 566 costs include construction, contingencies, installation services, and overhead costs. The Other funds costs include administration of contracts, easements, rights-of-way, and other miscellaneous costs. These costs are based on actual construction costs in the State of Mississippi and on the actual value of land and services in the watershed.

All buildings located upstream above floodwater retarding structures 8, 28, 35, and 38 affected by the sediment or flood pools will be abandoned. All roads affected by the sediment or flood pools above floodwater retarding structures 3, 8, 36, and 38 will be abandoned. The first road above structure no. 28 will be relocated. The roads shown above structures 6, 13, 16, 18, and 35 will be raised to an elevation of at least 3 feet above the flood pool. The creosote power line poles affected by the flood pools of structures 3, 8, 28, and 40 will be relocated. The pipeline shown above structure no. 16 will be flooded so infrequent and for such a short duration, it is not considered practical to anchor or relocate the pipeline. The costs for these alterations are local costs and are included in the right-of-way costs as shown on Table 2, footnote 3.

Water flow control devices will be installed in floodwater retarding structures 8, 16, 19, 20, 24, 25, 28, 30, 38, 39, and 40. These devices will be installed as mitigating measures and justified as P.L. 566 costs for fish losses which will result from the construction of the main Tuscumbia channel. These costs are included in the engineer's estimate, Table 2, footnote 2.

Flood Prevention Channels

Flood prevention channels are to be installed at an estimated total cost of $2,188,715, of which $2,019,545 or about 92 percent will be financed from P.L. 566 funds and $169,170 or about 8 percent will be financed from Other funds.

P.L. 566 funds costs include construction, contingencies, installation services, and overhead costs. Other funds costs include administration of contracts, costs of easements and rights-of-way, and other miscellaneous costs, Table 2.

There will be 9,250 linear feet of levees and 9 water flow control devices installed in conjunction with the main Tuscumbia channel improvement as shown on the Project Map, Figure 4, page 51 . The water flow control devices will consist of two corrugated metal weirs with flash boards for managing water levels. These measures will be installed as mitigating measures to insure that the 2,119 acres of existing duck habitat areas will be maintained in their present condition. The estimated total installation cost of these measures is included in the installation cost of main Tuscumbia channel.

There are county, state and Federal highway bridges and railroad bridges to be altered (reinforced) due to construction of the flood prevention channels. Reinforcements to be made are on: Bridge Creek - the county bridge located approximately one-half mile north of the Shady Grove Church, the county road bridge on the Corinth-Farmington road, the Gulf, Mobile and Ohio Railroad bridge, and the Southern Railroad bridge; Pollys Creek - the county road bridge located approximately one and one-half miles south of Rienzi, the bridge located on U. S. Highway 45, and the Gulf, Mobile and Ohio Railroad bridge; Hinkle Creek - the bridge on U. S. Highway 45 and the Gulf, Mobile and Ohio Railroad bridge; Main Tuscumbia - the county road bridge located approximately one mile southeast of Thrasher, the county road bridge located one and one-half miles north of Thrasher, the county line road bridge one mile southeast of Rienzi, the county road bridge two and one-half miles east of Biggersville, and the first county road bridge north of the Mississippi-Tennessee line; and the bridge on State Highway 356 just east of Rienzi, the bridges on U. S. Highways 45 and 72, and the Gulf, Mobile and Ohio Railroad bridge. These reinforcements are necessitated by deepening the channel. The costs for making these reinforcements are construction costs and are included in Table 2, footnote 2.

The first county road bridge north of U. S. Highway 72 and approximately two and one-fourth miles east of the Community of Gift will have to be replaced. The cost for replacing this bridge is a local cost and is included in easement and right-of-way costs, Table 2, footnote 3.

The total installation cost for the main Tuscumbia channel includes $39,255 for recessing Cypress Creek channel to grade with Tuscumbia channel; and for mitigating damages to the existing wetland areas in the lowest reach adjacent to Cypress Creek should damages actually occur as a result of recessing the Cypress channel.

Estimated Schedule of Funds by Project Years

Project Year	P.L. 566 Funds	Other Funds	Total
First	$ 85,985	$242,379	$328,364
Second	221,680	271,965	493,645
Third	503,256	336,530	839,786
Fourth	421,494	324,778	746,272
Fifth	579,827	386,614	966,441
Sixth	396,569	283,630	680,199
Seventh	1,443,141	409,685	1,852,826
Eighth	634,929	264,594	899,523
Ninth	310,365	235,360	545,725
Tenth	113,356	220,629	333,985
Total	$4,710,602	$2,976,164	$7,686,766

EFFECTS OF WORKS OF IMPROVEMENT

After installation of the proposed project measures, the total area benefited by structural measures amounts to 26,214 acres. By having adequate outlets provided, there will be an additional 6,031 acres benefited. These acres are located along tributary streams on which no structural measures are planned. Therefore, the total acres benefited by structural measures amount to 32,245, of which 2,168 acres are in Tennessee. There are 1,992 acres of flood plain land above the flood pools of the proposed 22 floodwater retarding structures that are benefited by land treatment measures. Also, there are 1,228 flood plain acres within the flood pools of the proposed 22 floodwater retarding structures. This makes a total of 35,465 acres of flood plain land within the watershed. Approximately 47 percent or 3,803 acres of the lower section of the main flood plain, 83 percent or 5,093 acres of the middle section of the main flood plain, and 84 percent or 9,270 acres of the upper section of the main flood plain plus the flood plain of the tributaries directly benefited from P.L. 566 structural measures will have protection from damaging floods of approximately a three-year frequency during the cropping season. Approximately 78 percent or 20,458 acres of the total flood plain benefited from P.L. 566 structural measures will have this same protection.

After the P.L. 566 project installation, the peak flow from the maximum runoff producing storm in the evaluation series at the lowest reach on Tuscumbia River will be reduced about 35 percent and the stage about 35 percent. No adverse effects are expected downstream as a result of the installation of the P.L. 566 structural measures.

The installation of the P.L. 566 measures will effect a reduction in acres flooded of 100 percent for a small storm, 38 percent for a medium storm, and 16 percent for a large storm.

The reduction in the frequency and area flooded during the cropping season will make possible the intensification of flood plain land which under

present conditions is too hazardous for cultivation. This reduction will permit better land preparation, cultivation, insect control, and use of improved varieties of seed, etc. Increased yields will result with more income for flood plain landowners and operators. Also, the increased yields will increase all farm income, especially the low income farmers which comprise approximately 50 percent of the farmers in the watershed.

After installation of the P.L. 566 measures, the annual rate of sediment yield at the junction of Cypress Creek will be reduced to approximately 157,484 tons per year.

Flood plain acres benefited by structural measures amount to 32,245 acres and are owned by approximately 727 landowners. The benefited acreage per ownership ranges from 10 acres to 800 acres. Higher yields of crops and pastures can be expected on this land. The proposed project will reduce the frequency of flooding sufficiently so that farmers can install and maintain needed field ditches on flood plain land. There will be no expected change watershed-wide in acreages of allotted crops. There may be an increase in cotton acreage on the flood plain. If so, these acres will be transferred from upland within the watershed so that the upland areas may be established to more suitable soil conserving crops.

Direct flood prevention benefits are expected to occur downstream on the Hatchie River flood plain. However, these benefits were not evaluated at this time and were not used in project justification.

Fish and duck habitat will be affected by this project. It is anticipated that 2,119 acres of woodland that remained flooded throughout the winter will only be flooded at shorter intervals after the works of improvement are installed. This damage to duck habitat will be partially mitigated by the construction of levees and 9 water flow control devices which will hold water on these areas through the winter. These levees and water flow control devices will also prevent the draining of the oxbow lakes adjacent to the main channel. When the Tuscumbia bottom overflows during the spring and summer, the oxbow lakes are connected with the river for long periods. This flooding provides more feeding territory for fish and an exchange of fish between the river and the lakes. Reduced frequency and number of days of flooding will affect the fish species composition and the quality of fishing. To mitigate this damage to sport fishing,water flow control devices,which will allow water level to be fluctuated, will be installed in floodwater retarding structures 8, 16, 19, 20, 24, 25, 28, 30, 38, 39, and 40. This will allow fish population control and provide better fishing in these reservoirs. These devices will also allow water to be lowered and duck foods planted around the lake margins. This will further mitigate the damage to natural duck habitat in the Tuscumbia bottom.

A timber management program, which favors woodland wildlife species, will be followed and managed by the individual farmers through conservation farm plans with the Northeast Mississippi and the McNairy County, Tennessee, Soil Conservation Districts.

The public will benefit by increased fish production, waterfowl and other recreational opportunities afforded by the 22 floodwater retarding structures, the eight duck habitat areas, and by land treatment measures.

Most of the natural vegetation along the 130.53 miles of channels to be constructed and cleaned out will be destroyed in the process. This will naturally disturb small game habitat but this disturbance will be temporary. Vegetation on these channel banks will be encouraged. After the first growing season, these ditch banks will again provide game cover. This type of cover is often better than that originally on the stream banks since it has changed from brush and small trees to annual weeds and legumes. Farmers will be encouraged to plant wildlife food along these channels. The natural vegetation along these channels will compensate for the wildlife food and habitat affected by the improvement of the flood prevention channels.

PROJECT BENEFITS

The estimated total average annual benefits, evaluated and used in project justification, accruing to the works of improvement for flood prevention amount to $366,556 (Table 6). In addition, it is estimated that land treatment measures will provide damage reduction benefits of $11,337.

The damage reduction benefits are estimated as follows: crops and pastures - $321,568, road and bridge - $21,971, and indirect - $34,354.

The application of the planned project works of improvement will reduce the average annual damages presently occurring to crops and pastures from $453,882 to $132,314, roads and bridges from $38,685 to $16,714, and indirect damages from $49,257 to $14,903.

Non-agricultural benefits amount to $56,325. These benefits result from reduced bridge damages, reduced damages to roadbeds, loss of gravel from road surfaces and indirect damage reduction.

The expected reduction of flood hazards will permit a higher level of fertilization, cultivation, and insect control because of less risk. These will result in increased yields and a minor change in cropping pattern to higher value of crops on the flood plain land.

Increased fishing water in the watershed will be provided by the construction of 22 floodwater retarding structures. These reservoirs will be correctly stocked with fingerling fish from Federal hatcheries. Technical assistance will be given landowners on stocking and managing these reservoirs for fish production.

A water flow control device (sliding gate) will be provided for 11 of the floodwater retarding structures. This will allow the permanent pool level to be drawn down 2 to 3 feet when necessary. A much better fish management program is possible with facilities for fluctuating water levels. This also may aid in the control of aquatic vegetation. The management of these 11

floodwater retarding structures for fish production will mitigate for the damage of the fish habitat caused by the construction of the main Tuscumbia River channel.

A duck management program will be made possible by the water level control devices in the 11 floodwater retarding structures. The water level will be dropped three feet at the proper season. Browntop or Japanese millet will be planted in the drawdown area. When the crop is matured in the fall, the gate will be closed so that the duck food will be flooded. Technical assistance is provided landowners in planning programs for duck feeding areas and in fish management.

Eight areas along the main Tuscumbia channel north of U. S. Highway 72 will be maintained as wildlife habitat areas. Water flow control devices and the construction of levees will maintain each of these areas in its present condition for wildlife habitat.

COMPARISON OF BENEFITS AND COSTS

Floodwater retarding structures, in conjunction with channel improvements, are to be installed, operated, and maintained at an estimated annual cost of $177,070 and will have an estimated average annual benefit of $366,556, with a benefit-cost ratio of 2.1 to 1.0, Table 6.

PROJECT INSTALLATION

The works of improvement are to be installed over a ten-year installation period.

The intensified fire control measure will be installed by the Mississippi Forestry Commission in cooperation with the U. S. Forest Service.

Land treatment measures will be installed during the ten-year installation period by the farmers through conservation farm plans in cooperation with their respective Soil Conservation Districts.

Land treatment measures above structural measures will be installed during the first seven years of the installation period. The remaining three years will be used to install those land treatment measures in the flood plain, which are contingent upon the installation of the planned structural measures.

These measures will be planned and applied farm by farm within the watershed consistent with the objectives of the respective Soil Conservation Districts and this plan. Additional technical assistance to accelerate the installation of these measures will be provided by the Soil Conservation Service. The technical assistance required for planting the trees and for hydrologic stand improvement will be provided by the Mississippi Forestry Commission and the Tennessee Division of Forestry in cooperation with the U. S. Forest Service.

Critical area treatment measures will be installed by the Commissioners of the Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee by contract during the first seven years of

the installation period. The technical assistance required for establishing the critical area measures and for establishing roadside erosion control will be provided by the Soil Conservation Service. Technical assistance required for planting the trees will be provided by the Mississippi Forestry Commission and the Tennessee Division of Forestry in cooperation with the U. S. Forest Service.

All structural measures in Mississippi will be installed by contract during the last nine years of the ten-year installation period by the Tuscumbia Drainage District of Mississippi. The structural measure in Tennessee, Main Tuscumbia channel, will be constructed during the seventh year of the installation period, and will be installed by contract by the Tuscumbia River Watershed District (Tennessee). The Soil Conservation Service will provide all engineering and other installation services (Table 2).

To facilitate the installation of structural measures, three construction units have been designated. These units are described in Table 7.

All land, easements, and rights-of-way will be secured in Mississippi by the Tuscumbia Drainage District of Mississippi and in Tennessee, by the Tuscumbia River Watershed District of Tennessee. The Tuscumbia Drainage District of Mississippi has sufficient legal authority (including the power of eminent domain) as provided in Mississippi Senate Bill 1220, extraordinary session 1955 to acquire all necessary land, easements, and rights-of-way in Mississippi.

The Tuscumbia River Watershed District of Tennessee also has sufficient legal authority (including the power of eminent domain) as provided in the Tennessee Watershed District Act of 1955, as amended, to acquire all necessary land, easements, and rights-of-way in Tennessee.

Federal assistance for carrying out the works of improvement on non-Federal land as described in this plan will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress; 68 Stat. 666) as amended.

Sequence of Doing Work

(1) The Northeast Mississippi Soil Conservation District of Mississippi and the Soil Conservation District of McNairy County, Tennessee, will obtain agreements to carry out recommended soil conservation measures and basic farm conservation plans from owners of not less than 50 percent of the land situated in the drainage area above each floodwater retarding structure.

(2) Not less than 75 percent of the effective land treatment measures will be installed, or their installation commenced, on those sediment source areas which constitute a serious hazard to the satisfactory design, operation, and maintenance of structural measures before their installation is started.

(3) Items 1 and 2 will be complied with on the drainage area above each structure prior to providing P.L. 566 funds for the construction of that structure.

(4) Construct the floodwater retarding structures and channels in the sequence as follows:

Second Project Year - Floodwater Retarding Structures 20 and 21.

Third Project Year - Floodwater Retarding Structures 4, 14, 25, and 38.

Fourth Project Year - Floodwater Retarding Structures 16, 18, 32, and 39.

Fifth Project Year - Floodwater Retarding Structures 8, 24, 34, and 36.

Sixth Project Year - Floodwater Retarding Structures 3, 6, 19, and 40.

Seventh Project Year - Floodwater Retarding Structures 13, 28, 30, and 35; Main channel of Tuscumbia River from junction with Hatchie River upstream to junction with Estes Creek; and Lateral channels on Estes, Underwood, and Tarebreeches Creeks.

Eighth Project Year - Main Tuscumbia channel upstream to junction with Hurricane Creek and lateral channels on Cane, Kossuth, Bridge, Phillips, Mays, Parmicha, and Tick Creeks.

Ninth Project Year - Complete main channel to Gulf, Mobile and Ohio Railroad and lateral channels on Hurricane, Browder, Taylor, Holly, Hinkle, Bynum, McDougal, and Moore Creeks.

Tenth Project Year - Lateral channels on Pollys, Boone, Kings, Brush, and Mile Creeks, and the North Fork on Main Creek.

FINANCING PROJECT INSTALLATION

The Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee fully recognize the expenses of organization, costs of legal services, and miscellaneous expenses they must bear.

It is expected that the Tuscumbia Drainage District of Mississippi will purchase all land, easements, and rights-of-way for the 22 floodwater retarding structures. It is expected that all land, easements, and rights-of-way for channels will be donated in both Mississippi and Tennessee.

The Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee plan to apply for a Farmers Home Administration loan to purchase the necessary land, easements, and rights-of-way, the necessary preliminary legal fees, the advertising for bids, the awarding of contracts, and for any other costs that may be incurred in the installation of the planned works of improvement. A letter of intention has been filed with the local Farmers Home Administration.

The Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee will levy an annual tax in their respective

State to assure that the necessary funds will be available as needed. The assessment rolls and the annual tax assessments will be set up in each State as soon as the plan is approved.

The total cost for establishing the land treatment measures is estimated to be $2,821,278, of which $558,604 will be financed from P.L. 566 funds and $2,262,674 will be financed from Other funds, Table 1.

The establishment of the non-critical area land treatment measures will be financed by the individual landowners and operators. They will utilize the Agricultural Conservation Program to the extent possible for establishing these measures.

The cost of technical assistance for installing the forestry measures is $147,940. This will be financed as follows: Mississippi Forestry Commission, $41,500; Tennessee Division of Forestry, $3,050; and P.L. 566 funds, $103,390.

The establishment of the critical area land treatment measures is the responsibility of the Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee in their respective State. The cost of establishing grasses and legumes, debris basins, and the roadside erosion control measures will be cost-shared by the Soil Conservation Service under Public Law 566 and the respective districts. The cost of establishing the tree planting on non-Federal land will be cost-shared by the Mississippi Forestry Commission and the Tennessee Division of Forestry, in cooperation with the U. S. Forest Service under P.L. 566, and the Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee. The respective Districts will finance their share of the cost of installing these measures in the form of labor and equipment hire for site preparation, transportation of supplies, seed, fertilizer, and/or other similar contributions in lieu of cash. These services in kind will equal or exceed the local cost-sharing shown in the tables. The cost of providing additional support for the cooperative forest fire control program in Mississippi will be financed by 50 percent from P.L. 566 funds and 50 percent from State Funds.

Structural measures will be installed at an estimated total cost of $4,865,488, of which $4,151,998 will be financed from P.L. 566 funds and $713,490 will be financed from Other funds. The Tuscumbia Drainage District of Mississippi will let all contracts in Mississippi, and the Tuscumbia River Watershed District of Tennessee will let all contracts in Tennessee. They will finance their share of project costs by utilizing the loan provisions of Section 8, P.L. 566 as amended by P.L. 1018. The loans will be repaid through assessments as provided in Mississippi Senate Bill 1220, extraordinary session 1955, and the Tennessee Watershed District Act of 1955, as amended.

P.L. 566 funds will be provided for the construction of levees with waterflow control devices and for the installation of water level control devices in 11 floodwater retarding structures to mitigate for adverse conditions caused by the construction of Main Tuscumbia channel.

Financial and other assistance to be furnished by the Soil Conservation Service in carrying out this project under P.L. 566 is contingent on the appropriation of funds for this project.

PROVISIONS FOR OPERATION AND MAINTENANCE

Land treatment measures will be operated and maintained by landowners and operators under cooperative agreements with the Northeast Mississippi Soil Conservation District and the McNairy County Soil Conservation District of Tennessee. The operation and maintenance of these measures will be the financial responsibility of the individual operators and landowners. Operation and maintenance of critical area plantings and debris basins will be financed in Mississippi by the Tuscumbia Drainage District and in Tennessee by the Tuscumbia River Watershed District from their regular maintenance funds. The intensified fire control program will be operated and maintained by the Mississippi Forestry Commission in cooperation with the U. S. Forest Service under the going Cooperative Forest Fire Control program. Technical assistance for operating and maintaining the forestry measures on privately owned land will be provided in Mississippi by the Mississippi Forestry Commission and in Tennessee, by the Tennessee Division of Forestry in cooperation with the U. S. Forest Service.

The Tuscumbia Drainage District of Mississippi will assume the responsibility to operate and maintain the floodwater retarding structures and the flood prevention channels in Mississippi. Operation and maintenance funds will be secured through assessments as provided in Mississippi by Mississippi Senate Bill 1220 extraordinary session 1955. The Tuscumbia River Watershed District of Tennessee will assume the responsibility to operate and maintain the flood prevention channel in Tennessee. Operation and maintenance funds in Tennessee will be secured through assessments as provided in Tennessee by the Tennessee Watershed District Act of 1955, as amended. The estimated annual cost for operation and maintenance is $6,257 for floodwater retarding structures, $13,053 for flood prevention channels, and $3,767 for structural replacement costs.

An annual cash sum of approximately $10,767 will be raised by the Tuscumbia Drainage District of Mississippi and $1,000 by the Tuscumbia River Watershed District of Tennessee through annual assessments to defray the cash obligation of said project for operation and maintenance of structural measures, mitigating measures, and for replacement costs for parts of structures having shorter life than 100 years. The balance of the annual operation and maintenance costs will be contributed as services in kind such as labor, equipment hire, and materials by the benefited landowners and operators in the watershed. These services will be arranged for in Mississippi by the Tuscumbia Drainage District and in Tennessee, by the Tuscumbia River Watershed District.

The maintenance of the floodwater retarding structures will include removal of debris from principal spillways, maintenance of adequate vegetation on the embankments and emergency spillways, and repair of any damage resulting from flood events.

The maintenance on the flood prevention channels will be accomplished by the use of sprays and/or labor and equipment to control obnoxious vegetative growth. This is expected to assist in the promotion and growth of desirable vegetation for stream bank erosion control and wildlife habitat. Additional maintenance will include the removal of drifts, debris and/or silt bars as necessary.

In Mississippi, the Tuscumbia Drainage District will make inspections on the 22 floodwater retarding structures and flood prevention channels; and in Tennessee, the Tuscumbia River Watershed District will make inspections on the flood prevention channel. These inspections will be made as frequently as necessary, at least annually, and after each damaging storm to determine operation and maintenance needs. The Soil Conservation Service will make technical assistance available for these inspections.

The Tuscumbia Drainage District of Mississippi will operate and maintain the water level control devices in the 11 floodwater retarding structures. This will allow the permanent pool level to be drawn down 2 to 3 feet when necessary thereby affording a better fish management program. Also, when the water level is lowered, suitable duck and wildlife food can be planted on the mud flats in the summer and be flooded again in the early fall when migratory fowl start their migration south.

The Tuscumbia Drainage District of Mississippi will assume the responsibility to operate and maintain the four wildlife areas in Mississippi and that portion of area no. 3 in Mississippi. The Tuscumbia River Watershed District of Tennessee will operate and maintain the three wildlife areas, including Dismal Swamp, and that portion of area no. 3 in Tennessee. The maintenance on these areas will include the removal of debris from the levees, maintenance of adequate vegetation on the levee embankments and the removal of debris from the sliding gates.

The Tuscumbia Drainage District of Mississippi and the Tuscumbia River Watershed District of Tennessee will negotiate with the individual landowners and reach agreements with them for public access to the 8 wildlife areas and the 11 floodwater retarding structures.

Detailed plans for operation and maintenance will be contained in the Watershed Protection Operation and Maintenance Agreement and this agreement will be executed prior to issuing invitations to bid.

TABLE 1 - ESTIMATED PROJECT INSTALLATION COSTS

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Item	No. to be Applied		Estimated Cost		
			P.L. 566 Funds	Other Funds	
	Unit	Non-Fed. Land	Non-Fed. Land	Non-Fed. Land	Total
(1)	(2)	(3)	(4)	(5)	(6)
LAND TREATMENT					
Soil Conservation Service					
Cropland	Ac.	30,841	0	314,815	314,815
Grassland	Ac.	20,441	0	853,496	853,496
Wildlife land	Ac.	3,238	0	71,720	71,720
Critical Area Planting					
Grasses & Legumes	Ac.	2,402	98,269	52,606	150,875
Roadside Erosion Control	Ac.	127	16,370	8,930	25,300
Debris Basins	No.	127	46,085	24,815	70,900
Technical Assistance			107,580	150,392	257,972
SCS Subtotal			268,304	1,476,774	1,745,078
Forest Service					
Tree Planting	Ac.	9,873	183,560	97,750	281,310
Forest land	Ac.	110,322	0	640,250	640,250
Cooperative Forest Fire Control	-	-	3,350	3,350	6,700
Technical Assistance	-	-	103,390	44,550	147,940
FS Subtotal	-	-	290,300	785,900	1,076,200
TOTAL LAND TREATMENT	-	-	558,604	2,262,674	2,821,278

TABLE 1 - (Continued)

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Item	No. to be Applied		Estimated Cost		
	Unit	Non-Fed. Land	P.L. 566 Funds Non-Fed. Land	Other Funds Non-Fed. Land	Total
(1)	(2)	(3)	(4)	(5)	(6)
STRUCTURAL MEASURES					
Soil Conservation Service					
Floodwater Retarding Structures	No.	22	1,581,350	0	1,581,350
Stream Channel Improvement	Mi.	130.53	1,506,139	0	1,506,139
Subtotal - Construction	-	-	3,087,489	0	3,087,489
INSTALLATION SERVICES					
Soil Conservation Service					
Engineering Services			687,054	0	687,054
Other			377,455	0	377,455
Subtotal - Installation Services			1,064,509	0	1,064,509
OTHER COSTS					
Administration of Contracts			0	18,400	18,400
Land, Easement & Right-of-way			0	667,450	667,450
Other 2/			0	27,640	27,640
Subtotal - Other			0	713,490	713,490
TOTAL STRUCTURAL MEASURES			4,151,998	713,490	4,865,488
TOTAL PROJECT			4,710,602	2,976,164	7,686,766
SUMMARY					
Subtotal SCS			4,420,302	2,190,264	6,610,566
Subtotal FS			290,300	785,900	1,076,200
TOTAL PROJECT			4,710,602	2,976,164	7,686,766

1/ Price base 1962
2/ Legal costs for making tax assessment rolls

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT

Tuscumbia Watershed, Mississippi and Tennessee

Measures (1)	Unit (2)	Applied To-Date (3)	Total Cost (Dollars) 1/ (4)
LAND TREATMENT			
Cropland			
Conservation Cropping System	Ac.	10,480	10,480
Gradient Terraces	Mi.	700	105,000
Grassed Waterways	Ac.	109	8,965
Row Arrangement	Ac.	900	1,800
Mains and Laterals	Mi.	110	165,000
Surface Field Ditches	Mi.	160	60,000
Diversion Construction	Mi.	60	25,500
Contour Farming	Ac.	7,793	7,793
Streambank Protection	Mi.	1.7	340
Stream Channel Improvement	Mi.	6.0	4,500
Grasses and Legumes in Rotation	Ac.	1,316	1,316
Subtotal			390,694
Grassland			
Pasture and hayland planting	Ac.	3,913	164,346
Pasture and hayland renovation	Ac.	4,643	120,718
Farm Ponds	No.	1,150	345,000
Mains and Laterals	Mi.	35	52,500
Surface Field Ditches	Mi.	110	41,250
Stream Channel Improvement	Mi.	1.9	1,425
Gradient Terraces	Mi.	334	50,100
Diversion Construction	Mi.	6	2,550
Subtotal			777,889
Wildlife Land			
Wildlife Habitat Development	Ac.	402	4,020
Subtotal			4,020
Woodland			
Tree Planting	Ac.	8,614	177,448
Hydrologic Stand Improvement			
Timber Stand Improvement	Ac.	1,000	10,000
Intermediate Cut	Ac.	3,000	-
Subtotal			187,448
TOTAL			1,360,051

1/ Price base 1963

TABLE 2 - ESTIMATED STRUCTURE COST DISTRIBUTION

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Item	Installation Cost - P.L. 566 Funds					Instal. Cost - Other Funds				Estimated Total Cost
	Construction		Instal. Service		Total P.L. 566 Funds	Other			Total Other	
	Engineering Estimate	Contingencies	Engineering	Other		Adm. of Contract	Easements & R/W	Other		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mississippi										
22 Floodwater Retarding Structures	1,411,920	169,430	357,244	193,859	2,132,453	9,800	520,400	14,120	544,320	2,676,773
119.61 miles Channel Improvement	1,021,629	122,594	249,025	139,326	1,532,574	7,600	124,300	10,289	142,189	1,674,763
Total - Mississippi	2,433,549	292,024	606,269	333,185	3,665,027	17,400	644,700	24,409	686,509	4,351,536
Tennessee										
10.92 miles Channel Improvement	323,139	38,777	80,785	44,270	486,971	1,000	22,750	3,231	26,981	513,952
Total - Tennessee	323,139	38,777	80,785	44,270	486,971	1,000	22,750	3,231	26,981	513,952
TOTAL - STRUCTURAL MEASURES	2/ 2,756,688	330,801	687,054	377,455	4,151,998	18,400	3/ 667,450	27,640	713,490	4,865,488

1/ Price base 1962

2/ Includes $500 each for wildlife gate (duck window) in Structures 8, 16, 19, 20, 24, 25, 28, 30, 38, 39, and 40. Includes bridge alterations of $40,000 in Mississippi and $4,000 in Tennessee on the Main Channel. Includes bridge alterations in Mississippi of $6,500 on Bridge Creek, $4,500 on Polly's Creek, and $8,000 on Hinkle Creek. Includes wildlife mitigation of $9,050 in Mississippi and $4,700 in Tennessee. Includes cost for overfall pipes of $158,500 in Mississippi and $3,000 in Tennessee. Includes $39,255 in Tennessee for recessing Cypress Creek Channel to grade with Tuscumbia Channel and for mitigating damages to the existing wetland areas in the lowest reach adjacent to Cypress Creek, should damages actually occur as a result of recessing the Cypress Channel.

3/ Includes $16,400 cost of moving power line poles on Structures 3, 8, 28, and 40. Includes $20,000 bridge alterations on Main Channel - Mississippi.

TABLE 3 - STRUCTURE DATA
FLOODWATER RETARDING STRUCTURES

Tuscumbia Watershed, Mississippi & Tennessee

Item	Unit	Structure Number 3	4	6	8
Drainage Area	Sq. Mi.	1.50	3.50	2.59	15.05
Storage Capacity					
Sediment					
Submerged	Ac. Ft.	137	212	134	693
Aereated	Ac. Ft.	123	175	103	618
Floodwater	Ac. Ft.	495	1,369	675	4,977
Total	Ac. Ft.	755	1,756	912	6,288
Between High & Low Stages	Ac. Ft.	283	2/	429	2/
Surface Area					
Sediment Pool	Acre	32	71	45	157
Floodwater Pool	Acre	90	240	132	692
Volume of Fill	Cu. Yds.	60,719	117,249	58,527	206,955
Elevation Top of Dam	Feet	464.0	479.1	459.2	458.6
Maximum Height of Dam	Feet	27.3	29.6	26.4	30.8
Emergency Spillway					
Crest Elevation	Feet	461.2	473.7	457.2	454.6
Bottom Width	Feet	110	150	50	172
Type		veg.	veg.	veg.	veg.
Percent Chance of Use		2	1	4	2
Ave. Curve No. - Cond. II		85	83	79	78
Emergency Spillway Hydrograph					
Storm Rainfall (6-hr.)	Inch	8.46	12.00	5.60	8.50
Storm Runoff	Inch	6.66	9.85	3.32	5.86
Velocity of Flow (V_c)	Ft/Sec.	3/	3/	3/	3/
Discharge Rate	CFS	3/	3/	3/	3/
Max. w.s. Elevation	Feet	3/	3/	3/	3/
Freeboard Hydrograph					
Storm Rainfall (6-hr.)	Inch	15.16	30.00	8.50	15.20
Storm Runoff	Inch	13.24	27.50	5.98	12.28
Velocity of Flow (V_c) 1/	Ft/Sec.	7.35	10.02	6.01	8.56
Discharge Rate	CFS	1,500	5,800	380	3,650
Max. w.s. Elevation	Feet	464.0	479.1	459.2	458.6
Principal Spillway					
Capacity- Low Stage	CFS	15	115	39	272
Capacity - High Stage	CFS	95	2/	102	2/
Capacity Equivalents					
Sediment Volume					
Submerged	Inch	1.72	1.14	.97	.86
Aereated	Inch	1.54	.94	.74	.77
Detention Volume	Inch	6.20	7.34	4.88	6.20
Spillway Storage	Inch	3.59	8.61	2.11	3.86
Class of Structure		b	c	a	b

TABLE 3 - (Continued)

Tuscumbia Watershed, Mississippi & Tennessee

Item	Unit	Structure Number 13	14	16	18
Drainage Area	Sq. Mi.	1.53	1.78	3.24	1.68
Storage Capacity					
Sediment					
Submerged	Ac. Ft.	5/ 132	141	260	5/ 118
Aereated	Ac. Ft.	24	120	229	55
Floodwater	Ac. Ft.	413	481	983	427
Total	Ac. Ft.	569	742	1,472	600
Between High & Low Stages	Ac. Ft.	280	324	308	290
Surface Area					
Sediment Pool	Acre	47	41	79	41
Floodwater Pool	Acre	105	102	198	104
Volume of Fill	Cu. Yds.	34,037	82,705	91,885	29,958
Elevation Top of Dam	Feet	448.7	493.8	513.4	482.3
Maximum Height of Dam	Feet	19.7	25.1	28.3	20.9
Emergency Spillway					
Crest Elevation	Feet	446.7	491.8	511.4	480.3
Bottom Width	Feet	42	42	57	42
Type		veg.	veg.	veg.	veg.
Percent Chance of Use		4	4	4	4
Ave. Curve No. - Cond. II		83	83	84	80
Emergency Spillway Hydrograph					
Storm Rainfall (6-hr.)	Inch	5.60	5.60	5.60	5.60
Storm Runoff	Inch	3.72	3.72	3.82	3.43
Velocity of Flow (V_c)	Ft/Sec.	3/	3/	3/	3/
Discharge Rate	CFS	3/	3/	3/	3/
Max. w. s. Elevation	Feet	3/	3/	3/	3/
Freeboard Hydrograph					
Storm Rainfall (6-hr.)	Inch	8.50	8.50	8.50	8.50
Storm Runoff	Inch	6.45	6.45	6.58	6.09
Velocity of Flow (V_c) 1/	Ft/Sec.	5.95	5.95	6.02	5.95
Discharge Rate	CFS	320	320	430	320
Max. w.s. Elevation	Feet	448.7	493.8	513.4	482.3
Principal Spillway					
Capacity - Low Stage	CFS	30	20	39	18
Capacity - High Stage	CFS	88	99	103	90
Capacity Equivalents					
Sediment Volume					
Submerged	Inch	1.61	1.49	1.51	1.31
Aereated	Inch	.29	1.27	1.33	.61
Detention Volume	Inch	5.04	5.08	5.69	4.76
Spillway Storage	Inch	3.07	2.35	2.55	2.40
Class of Structure		a	a	a	a

TABLE 3 - (Continued)

Tuscumbia Watershed, Mississippi & Tennessee

Item	Unit	Structure Number 19	20	21	24
Drainage Area	Sq. Mi.	4.81	5.37	1.88	5.42
Storage Capacity					
Sediment					
Submerged	Ac. Ft.	262	285	124	317
Aereated	Ac. Ft.	245	264	114	281
Floodwater	Ac. Ft.	1,170	1,395	450	1,658
Total	Ac. Ft.	1,677	1,944	688	2,256
Between High & Low Stages	Ac. Ft.	2/	2/	300	2/
Surface Area					
Sediment Pool	Acre	62	94	38	85
Floodwater Pool	Acre	126	195	84	311
Volume of Fill	Cu. Yds.	61,615	55,857	29,155	116,832
Elevation Top of Dam	Feet	464.7	463.7	470.3	457.0
Maximum Height of Dam	Feet	29.7	24.7	20.3	33.0
Emergency Spillway					
Crest Elevation	Feet	462.7	461.7	468.3	454.0
Bottom Width	Feet	70	75	43	197
Type		veg.	veg.	veg.	veg.
Percent Chance of Use		4	4	4	4
Ave. Curve No. - Cond. II		72	73	76	82
Emergency Spillway Hydrograph					
Storm Rainfall (6-hr.)	Inch	5.60	5.60	5.60	5.58
Storm Runoff	Inch	2.67	2.76	3.04	3.60
Velocity of Flow (V_c)	Ft/Sec.	3/	3/	3/	3/
Discharge Rate	CFS	3/	3/	3/	3/
Max. w.s. Elevation	Feet	3/	3/	3/	3/
Freeboard Hydrograph					
Storm Rainfall (6-hr.)	Inch	8.50	8.50	8.50	15.20
Storm Runoff	Inch	5.14	5.26	5.61	12.84
Velocity of Flow (V_c) 1/	Ft/Sec.	6.05	6.00	6.00	7.48
Discharge Rate	CFS	520	550	330	2,725
Max. w.s. Elevation	Feet	464.7	463.7	470.3	457.0
Principal Spillway					
Capacity - Low Stage	CFS	82	70	19	94
Capacity - High Stage	CFS	2/	2/	89	2/
Capacity Equivalents					
Sediment Volume					
Submerged	Inch	1.02	.99	1.23	1.10
Aereated	Inch	.96	.92	1.13	.97
Detention Volume	Inch	4.56	4.87	4.48	5.74
Spillway Storage	Inch	1.38	1.45	1.86	3.70
Class of Structure		a	a	a	a

TABLE 3 - (Continued)

Tuscumbia Watershed, Mississippi & Tennessee

Item	Unit	Structure Number 25	28	30	32
Drainage Area	Sq. Mi.	2.46	11.70	3.10	1.98
Storage Capacity					
Sediment					
Submerged	Ac. Ft.	113	5/ 906	222	5/ 100
Aereated	Ac. Ft.	101	404	196	51
Floodwater	Ac. Ft.	719	3,332	995	567
Total	Ac. Ft.	933	4,642	1,413	718
Between High & Low Stages	Ac. Ft.	449	2/	565	199
Surface Area					
Sediment Pool	Acre	48	255	70	39
Floodwater Pool	Acre	133	505	188	112
Volume of Fill	Cu. Yds.	43,154	63,563	72,338	32,727
Elevation Top of Dam	Feet	492.5	456.9	492.8	468.3
Maximum Height of Dam	Feet	22.5	27.9	28.4	21.3
Emergency Spillway					
Crest Elevation	Feet	490.5	452.9	490.8	466.3
Bottom Width	Feet	50	225	56	48
Type		veg.	veg.	veg.	veg.
Percent Chance of Use		4	4	4	4
Ave. Curve No. - Cond. II		83	78	83	84
Emergency Spillway Hydrograph					
Storm Rainfall (6-hr.)	Inch	5.60	5.60	5.60	5.60
Storm Runoff	Inch	3.72	3.24	3.72	3.82
Velocity of Flow (V_c)	Ft/Sec.	3/	3/	3/	3/
Discharge Rate	CFS	3/	3/	3/	3/
Max. w. s. Elevation	Feet	3/	3/	3/	3/
Freeboard Hydrograph					
Storm Rainfall (6-hr.)	Inch	8.50	4/ 15.20	8.50	8.50
Storm Runoff	Inch	6.45	12.28	6.45	6.58
Velocity of Flow (V_c) 1/	Ft/Sec.	5.94	8.86	5.98	5.85
Discharge Rate	CFS	375	5,000	420	340
Max. w. s. Elevation	Feet	492.5	456.9	492.8	468.3
Principal Spillway					
Capacity - Low Stage	CFS	25	187	47	24
Capacity - High Stage	CFS	91	2/	105	91
Capacity Equivalents					
Sediment Volume					
Submerged	Inch	.86	1.45	1.34	.95
Aereated	Inch	.77	.65	1.19	.48
Detention Volume	Inch	5.48	5.34	6.02	5.38
Spillway Storage	Inch	2.19	3.66	2.49	2.39
Class of Structure		a	a	a	a

TABLE 3 - (Continued)

Tuscumbia Watershed, Mississippi & Tennessee

Item	Unit	Structure Number 34	35	36	38
Drainage Area	Sq. Mi.	5.19	4.07	5.00	6.57
Storage Capacity					
Sediment					
Submerged	Ac. Ft.	415	192	391	468
Aereated	Ac. Ft.	387	169	371	439
Floodwater	Ac. Ft.	1,371	1,253	1,658	2,068
Total	Ac. Ft.	2,173	1,614	2,420	2,975
Between High & Low Stages	Ac. Ft.	2/	2/	2/	2/
Surface Area					
Sediment Pool	Acre	105	72	130	190
Floodwater Pool	Acre	258	203	300	410
Volume of Fill	Cu. Yds.	60,918	67,590	103,063	117,410
Elevation Top of Dam	Feet	477.5	473.0	491.2	496.8
Maximum Height of Dam	Feet	26.8	28.5	27.1	29.2
Emergency Spillway					
Crest Elevation	Feet	475.5	471.0	489.2	492.8
Bottom Width	Feet	72	68	72	120
Type		veg.	veg.	veg.	veg.
Percent Chance of Use		4	4	4	4
Ave. Curve No. - Cond. II		75	83	86	84
Emergency Spillway Hydrograph					
Storm Rainfall (6-hr.)	Inch	5.67	5.67	5.58	8.48
Storm Runoff	Inch	3.00	3.79	4.01	6.56
Velocity of Flow (V_c)	Ft/Sec.	3/	3/	3/	3/
Discharge Rate	CFS	3/	3/	3/	3/
Max. w. s. Elevation	Feet	3/	3/	3/	3/
Freeboard Hydrograph					
Storm Rainfall (6-hr.)	Inch	8.55	8.55	8.48	4/ 15.30
Storm Runoff	Inch	5.54	6.50	6.79	13.33
Velocity of Flow (V_c) 1/	Ft/Sec.	6.06	5.98	6.00	8.83
Discharge Rate	CFS	540	500	530	2,780
Max. w. s. Elevation	Feet	477.5	473.0	491.2	496.8
Principal Spillway					
Capacity - Low Stage	CFS	82	78	88	126
Capacity - High Stage	CFS	2/	2/	2/	2/
Capacity Equivalents					
Sediment Volume					
Submerged	Inch	1.50	.88	1.46	1.33
Aereated	Inch	1.40	.78	1.39	1.25
Detention Volume	Inch	4.95	5.77	6.21	5.90
Spillway Storage	Inch	1.90	2.12	2.55	5.26
Class of Structure		a	a	a	a

TABLE 3 - (Continued)
Tuscumbia Watershed, Mississippi & Tennessee

Item	Unit	Structure Number 39	Structure Number 40	Total
Drainage Area	Sq. Mi.	5.79	4.20	98.41
Storage Capacity				
Sediment				
Submerged	Ac. Ft.	450	220	6,292
Aereated	Ac. Ft.	424	206	5,099
Floodwater	Ac. Ft.	1,818	1,036	29,310
Total	Ac. Ft.	2,692	1,462	40,701
Between High & Low Stages	Ac. Ft.	2/	630	4,057
Surface Area				
Sediment Pool	Acre	140	55	1,896
Floodwater Pool	Acre	372	169	5,029
Volume of Fill	Cu. Yds.	102,173	101,565	1,709,995
Elevation Top of Dam	Feet	478.9	494.0	xxxxx
Maximum Height of Dam	Feet	27.9	28.9	xxxxx
Emergency Spillway				
Crest Elevation	Feet	475.9	492.0	xxxxx
Bottom Width	Feet	195	67	xxxxx
Type		veg.	veg.	xxxxx
Percent Chance of Use		4	4	xxxxx
Ave. Curve No. - Cond. II		85	73	xxxxx
Emergency Spillway Hydrograph				
Storm Rainfall (6-hr.)	Inch	5.60	5.60	xxxxx
Storm Runoff	Inch	3.93	2.76	xxxxx
Velocity of Flow (V_c)	Ft/Sec.	3/	3/	xxxxx
Discharge Rate	CFS	3/	3/	xxxxx
Max. w. s. Elevation	Feet	3/	3/	xxxxx
Freeboard Hydrograph				
Storm Rainfall (6-hr.)	Inch	4/ 15.22	8.50	xxxxx
Storm Runoff	Inch	13.30	5.26	xxxxx
Velocity of Flow (V_c) 1/	Ft/Sec.	7.53	6.66	xxxxx
Discharge Rate	CFS	2,700	500	xxxxx
Max. w. s. Elevation	Feet	478.9	494.0	xxxxx
Principal Spillway				
Capacity - Low Stage	CFS	126	42	xxxxx
Capacity - High Stage	CFS	2/	104	xxxxx
Capacity Equivalents				
Sediment Volume				
Submerged	Inch	1.46	.98	xxxxx
Aereated	Inch	1.37	.92	xxxxx
Detention Volume	Inch	5.89	4.62	xxxxx
Spillway Storage	Inch	4.08	1.69	xxxxx
Class of Structure		a	a	xxxxx

1/ Maximum during passage of hydrograph
2/ Single stage only
3/ Flow from emergency spillway hydrograph insignificant
4/ Class "b" freeboard hydrograph
5/ Elevation of principal spillway (riser) was increased beyond the 50-year sediment storage requirement in order to alleviate unsatisfactory impoundment of water (Section 3107.1 Watershed Protection Handbook).

TABLE 3A - STRUCTURE DATA - CHANNELS

Tuscumbia Watershed, Mississippi and Tennessee

Channel Designation	Station	Watershed Area 1/ (Sq. Mi.)	Planned Channel Capacity (CFS)	Bottom Width (Ft)	Side Slopes (Ratio)	Depth (Ft.)	Slope (Ft/Mi)	"n"	Velocity in Channel (Ft./Sec.)	Volume of Excavation (1000 Cu. yds.)
Main Tuscumbia	0 + 00	1.56	120							
				Clearing and snagging						
	46 + 00	3.96	305							
				Clearing and snagging						
	161 + 00	6.96	614							
										14.437
	255 + 50	18.07	1,471	14	1:1	10.6	6.39	.030	5.64	
										104.162
	442 + 00	40.83	2,290	19	1:1	13.5	3.88	.030	5.22	
										466.182
	921 + 50	113.74	4,679	37	1:1	14.9	2.62	.025	6.05	
										833.027
	1232 + 50	190.84	6,357	44	1:1	17.0	2.22	.025	6.13	
										1406.089
(State Line)	1648 + 00	234.56	3/5,278	44	1:1	17.0	1.54	.025	5.09	
										348.759
	1740 + 50	239.23	3/5,278	44	1:1	17.0	1.54	.025	5.09	
										242.439
(Junction Cypress)	1816 + 00	240.37	3/3,878	44	1:1	17.0	0.83	.025	3.74	
										767.972
(Junction Hatchie)	2224 + 50	2/250.11	3/3,878	44	1:1	17.0	0.83	.025	3.74	

TABLE 3A - (Continued)

Tuscumbia Watershed, Mississippi and Tennessee

Channel Designation	Stations	Watershed Area 1/ (Sq. Mi.)	Planned Channel Capacity (CFS)	Bottom Width (Ft.)	Side Slopes (Ratio)	Depth (Ft.)	Slope (Ft/Mi)	"n"	Velocity in Channel (Ft./Sec.)	Volume of Excavation (1000 Cu. yds.)
Tarebreeches Creek	0 + 00	11.24								
				Clearing and snagging						
	79 + 20	12.36								
Eastes Creek	0 + 00	0								
				Clearing and snagging						
	203 + 50	8.83								
Underwood Creek	0 + 00	0								
				Clearing and snagging						
	238 + 30	3.89								
Cane Creek	0 + 00	0								
				Clearing and snagging						
	236 + 00	8.02								
Kossuth Creek	0 + 00	0								
				Clearing and snagging						10.378 4/
	406 + 50	12.43								
Bridge Creek	0 + 00	0								
				Clearing and snagging						
	144 + 00	10.93								
				Clearing and snagging						125.297
	275 + 00	28.54	1,649	18	1:1	10.5	5.65	.030	5.51	
										96.467
	360 + 50	31.67	1,693	21	1:1	10.5	4.63	.030	5.12	

TABLE 3A - (Continued)

Tuscumbia Watershed, Mississippi and Tennessee

Channel Designation	Stations	Watershed Area 1/ (Sq. Mi.)	Planned Channel Capacity (CFS)	Bottom Width (Ft.)	Side Slopes (Ratio)	Depth (Ft.)	Slope (Ft/Mi)	"n"	Velocity in Channel (Ft./Sec.)	Volume of Excavation (1000 Cu. yds.)
Phillips Creek	0 + 00	0								
				Clearing and snagging						
	181 + 00	2.20								
Mays Creek	0 + 00	0								
				Clearing and snagging						
	173 + 00	3.91								
Parmicha Creek	0 + 00	0								
				Clearing and snagging						
	87 + 30	2.28	234	6	1:1	6.0	8.87	.040	3.25	
										25.975
	194 + 10	6.27	521	10	1:1	7.0	8.87	.035	4.38	
										17.257
	301 + 10	10.81	887	11	1:1	8.5	7.60	.035	5.29	
										8.890
	390 + 00	12.19	1,007	12	1:1	9.0	6.71	.030	5.33	
Tick Creek	0 + 00	0								
				Clearing and snagging						
	132 + 80	5.10								
Hurricane Creek	0 + 00	0								
				Clearing and snagging						
	315 + 00	13.20								
Holly Branch	0 + 00	0								
				Clearing and snagging						
	112 + 20	2.35								

TABLE 3A - (Continued)
Tuscumbia Watershed, Mississippi and Tennessee

Channel Designation	Stations	Watershed Area 1/ (Sq. Mi.)	Planned Channel Capacity (CFS)	Bottom Width (Ft)	Side Slopes (Ratio)	Depth (Ft.)	Slope (Ft/Mi)	"n"	Velocity in Channel (Ft./Sec.)	Volume of Excavation (1000 Cu. Yds.)
Browder Branch	0 + 00	0								
				Clearing and snagging						
	30 + 00	.57								
Taylor Creek	0 + 00	0								
				Clearing and snagging						
	22 + 00	.10								
Hinkle Creek	0 + 00	0								
				Clearing and snagging						
	201 + 50	5.00	491	10	1:1	7.0	10.30	.040	4.13	
										73.259
	309 + 00	9.83	855	11	1:1	9.0	7.87	.035	4.75	
										92.917
	421 + 50	10.83	938	12	1:1	9.5	4.97	.030	4.59	
										30.238
	520 + 40	15.46	1,274	15	1:1	10.5	4.54	.030	4.76	
Bynum Creek	0 + 00	0								
				Clearing and snagging						7.052 4/
	142 + 50	3.58								
McDougal Creek	0 + 00	0								
				Clearing and snagging						
	83 + 50	1.46								
Moores Creek	0 + 00	0								
				Clearing and snagging						
	90 + 50	1.96								

TABLE 3A - (Continued)

Tuscumbia Watershed, Mississippi and Tennessee

Channel Designation	Stations	Watershed Area 1/ (Sq. Mi.)	Planned Channel Capacity (CFS)	Bottom Width (Ft.)	Side Slopes (Ratio)	Depth (Ft.)	Slope (Ft/Mi)	"n"	Velocity in Channel (Ft./Sec.)	Volume of Excavation (1000 Cu.Yds)
Pollys Creek	0 + 00	0								
				Clearing and snagging						
	166 + 00	4.96								
				Clearing and snagging						3.996
	249 + 00	6.66	630	12	1:1	8.0	5.86	.035	3.94	
										10.400
	307 + 50	11.60	1,031	14	1:1	9.0	5.86	.030	4.98	
										31.629
	383 + 50	16.53	1,358	17	1:1	11.0	3.54	.030	4.41	
Boone Creek	0 + 00	0								
				Clearing and snagging						
	158 + 00	3.74								
Kings Creek	0 + 00	0								
				Clearing and snagging						
	250 + 50	8.51								
Brush Creek	0 + 00	0								
				Clearing and snagging						
	65 + 00	.86								
Mile Branch	0 + 00	0								
				Clearing and snagging						
	43 + 50	.47								
North Fork Main Tuscumbia	0 + 00	1.88								
				Clearing and snagging						
	50 + 70	2.07								

1/ Uncontrolled drainage area

2/ Does not include Cypress Creek Watershed of Tennessee

3/ Same size channel design used from cross-section 6 to junction with Hatchie River (see page 11 of narrative); decrease in capacity due to change in slope

4/ Cutoffs to improve channel alignment

TABLE 4 - ANNUAL COSTS

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Item	Amortization of Installation Cost 2/	Operation, Maintenance, and Replacement Costs 3/	Total
		Other Funds	
22 Floodwater Retarding Structures together with 130.53 miles of Channel Improvement	153,993	23,077	177,070
TOTAL	153,993	23,077	177,070

1/ Price base installation costs 1962, operation and maintenance long-term projected

2/ Floodwater Retarding Structures and Channel Improvement amortized 100 years at 3 percent interest (.03165)

3/ Includes $3,767 annual replacement costs on wildlife gates and overfall pipes.

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Item	Estimated Average Annual Damages		Damage Reduction Benefits
	Without Project	With Project	
Floodwater			
Crop and Pasture	453,882	132,314	321,568
Road, bridge, and other	38,685	16,714	21,971
Subtotal	492,567	149,028	343,539
Indirect	49,257	14,903	34,354
TOTAL	541,824	163,931	377,893

1/ Price base long-term projected

TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Evaluation Unit	AVERAGE ANNUAL BENEFITS: Damage Reduction	AVERAGE ANNUAL BENEFITS: Total	Average Annual Cost	Benefit Cost Ratio
22 Floodwater Retarding Structures together with 130.53 miles of Channel Improvement	366,556	366,556	177,070	2.1 to 1.0
TOTAL	2/366,556	366,556	177,070	2.1 to 1.0

1/ Price base annual benefits long-term projected costs (see Table 4)
2/ In addition, it is estimated that land treatment measures will provide damage reduction benefits of $11,337.

TABLE 7 - CONSTRUCTION UNITS

Tuscumbia Watershed, Mississippi and Tennessee
(Dollars) 1/

Construction Units and Structures	Annual Benefits	Annual Costs
Floodwater Retarding Structure No. 25, together with Kossuth Creek Channel Improvement	4,651	3,952
Floodwater Retarding Structure No. 3 and 4, together with Bridge and Phillips Creeks Channel Improvement	18,332	13,663
Floodwater Retarding Structure No. 30, together with Parmicha Creek Channel Improvement	7,665	6,080

1/ Price base annual benefits long-term projected and annual costs 1962

INVESTIGATIONS AND ANALYSES

Engineering

Engineering surveys for flood plain delineation and channel improvement consisted of valley cross sections taken along the main streams and their principal tributaries. Channel and flood plain distances were taken from aerial photographs.

Surveys for floodwater retarding structures consisted of topographic maps plotted from low level flight aerial photographs with a Kelsh Plotter. Mean sea level was used as the datum for elevation for all surveys.

Forty-three potential floodwater retarding structure sites were investigated. The 22 floodwater retarding structure sites, together with the selected channel, provided the most feasible means of attaining the objectives of the sponsors.

Floodwater retarding structure 4 is located just above a highly developed suburban area and is classified as a class "c" structure. Floodwater retarding structure 3 is located above a suburban area and a well traveled, paved county road and is classified as a class "b" structure. Floodwater retarding structure 8 is classified as a class "b" structure because it is located just above a well traveled, graveled county road and because of houses located in the flood plain below the structure. The remaining 19 floodwater retarding structures are classified as class "a" structures.

The Main channel was designed with a constant cross-sectional area from Station 1232 + 50 to its confluence with Hatchie River. This was done because much of the flood plain in this portion of the watershed is in dedicated woodland with the cultivated land on slightly higher elevations. Overflows permitted by this smaller size channel will maintain desirable fish population in the natural lakes in the low lands. The cultivated land will still receive benefits from the reduced peaks.

Hydraulic and Hydrologic

The engineering field surveys and valley cross section surveys were used to calculate the rating curves for each valley cross section. Stage versus cross sectional area in square feet, stage versus discharge in cubic feet per second and stage versus acres inundated curves and relationships were developed at one foot depth increments for each valley cross section. Manning's formula was used to calculate the stage versus cubic feet per second discharge relationships.

All precipitation data were obtained from the U. S. Weather Bureau Publication, "Climatological Data." Rainfall records from the Corinth, Booneville, and Ripley stations were compared and the Corinth station records were selected as representative of the watershed. Therefore, the daily records of the Corinth station were used to determine rainfall and runoff of the damaging storms to be included in the storm series tables.

Three storms of different size were routed through the entire watershed by the storage indication method of flood routing using an average duration of 9 hours for each storm. Peak discharge in cubic feet per second versus inches of runoff relationships were developed at the control section in each evaluation reach from information obtained by flood routing the above three storms through the watershed.

Runoff for each flooding storm was estimated from direct rainfall by the method outlined in the Hydrology Handbook, Supplement A, Section 4 of the Engineering Handbook. The flooding storms were then culled, those storms causing no damage were eliminated, and the remaining storms causing damage were included in the storm series.

Flood marks for the maximum storm in the evaluation period, 1942 through 1961, were obtained from local farmers and used to delineate the maximum flood plain area. This storm which occurred on March 21, 1955, amounted to 5.70 inches of rainfall, produced 4.89 inches of runoff, and flooded 35,465 acres of flood plain land.

Stage-area inundation tables were developed by one-foot depth increments for each evaluation reach under present conditions and after future conditions with the floodwater retarding structures and channel improvements in place.

Acres flooded by each storm in the evaluation series were determined for each evaluation reach and tabulated under present and future watershed conditions.

Soil cover complex data and runoff curves were developed above each individual floodwater retarding structure. Total runoff, distribution, inflow and water storage requirements for each floodwater retarding structure were developed using methods outlined in Engineering Memorandum MS-20 (EWP-5).

Geologic

Geologic conditions of the watershed were determined through field observations of geologic outcrops and by making hand auger borings at structure site locations. Preliminary foundation, spillway and borrow material investigations at seven sites were made by drilling six to eight holes along the centerline with a hand auger. These sites were selected as typical for the several physiographic regions. General observations were made at the remaining fifteen sites. Sufficient borrow material is available at or near the sites. There were no unusual conditions that would effect construction on the 22 floodwater retarding structures. A detailed investigation is recommended prior to final design.

Sedimentation

A field examination of the flood plain area was made to determine the extent of sediment damages. Erosion rates were determined by the use of soil decline relationships according to present and proposed land use conditions above each floodwater retarding structure. Sediment storage requirements

for each of the floodwater retarding structures were computed in accordance with Technical Release No. 12.

Soil Conditions

Soil surveys have been completed on 85 percent of the watershed. The soil survey maps show the type of soil, slope, degree of erosion and major land use. A field examination was made to determine the soil cover complex conditions and provide other work plan needs.

Land Use and Treatment Needs

Present land use was determined by use of a stratified random sampling procedure from the soil surveys and expanded to the entire watershed. Detailed information concerning the use of cultivated land was furnished by the work unit conservationist. Future land use and treatment measures needed were planned for the entire watershed based on a realistic evaluation of expanded data obtained from conservation needs inventory and farm plans.

Forest Conditions

A field survey determined the upland forest conditions in the watershed. Systematic samples showed ground cover, forest and hydrologic conditions, treatment needs, and measures. This survey, supporting data, information from other agencies, and forestry officials determined the amount of remedial measures. The installation period limits the amount of work in the recommended program. These measures include only those which contribute directly to flood reduction and soil stabilization.

Economic

Methods used in making the economic investigations and analyses follow those approved by the Soil Conservation Service in benefit-cost evaluations on land and water resource projects. Basic data were obtained from local farmers, agricultural workers, state and county highway officials, public utility companies, experiment stations, and Department of Agriculture publications.

Landowners and operators, farming approximately 30 percent of the flood plain, were interviewed to determine present land use and normal floodfree yields, anticipated use and yields with various degrees of protection from floodwater and percent damage by depths of inundation to crops and minor fixed improvements. This scheduled information was evaluated and summarized. Damageable values were derived from these summaries and from cost and price information by evaluation reaches.

Damageable values, stage-area and stage-damage relationships and flood series were used in estimating average annual damages without and with the project by evaluation reaches.

Highway and public utility officials were contacted for information on present damage, location, and estimated percent reduction in damage with various degrees of flood protection.

Values for determining the cost of easements and rights-of-way were obtained from the local sponsoring organizations, whose representation is familiar with the values throughout the watershed. The average values of $100 per acre on the floodwater retarding structures and $50 per acre for the channels were considered fair prices and were used in computation of easements and rights-of-way costs in this plan.

Long-term projected prices were derived from data furnished by the Agricultural Research Service and Agricultural Marketing Service, September 1957. Projected prices were used in all annual benefit and annual operation and maintenance costs computations. Present (1962) prices were used for installation costs. The costs of floodwater retarding structures and channel improvement were amortized over a 100-year period with interest rate of 3.0 percent (.03165).

No benefits were evaluated or claimed in this plan for the restoration of former use and productivity, changed land use and more intensive use due to reduction of flood hazards. The expected reduction of flood hazards will permit a higher level of fertilization, cultivation and insect control because of less risk. These will result in increased yields and a minor shift of cropping pattern to slightly higher value crops in the flood plain land. It is not expected that there will be any increase in acreage control crops (cotton, etc.) within the watershed.

No secondary benefits were evaluated or claimed in this plan.

No benefits were claimed on the Hatchie River flood plain immediately below the confluence of Tuscumbia River since they would be small and hard to identify.

The average annual costs of $100 per mile per year for operation and maintenance of project channels is estimated to be adequate in this area at this time.

Replacement costs were computed for the overfall pipes using an estimated life of 30 years. A 20-year estimated life was used in computing these costs on the water flow control devices in the 11 floodwater retarding structures and the 8 wildlife areas. The sinking fund method with an interest rate of three percent was used in computing these costs.

Fish and Wildlife

Fish and game investigations were made by field studies by biologists of the U. S. Fish and Wildlife Service, the Mississippi Game and Fish Commission and the Soil Conservation Service.

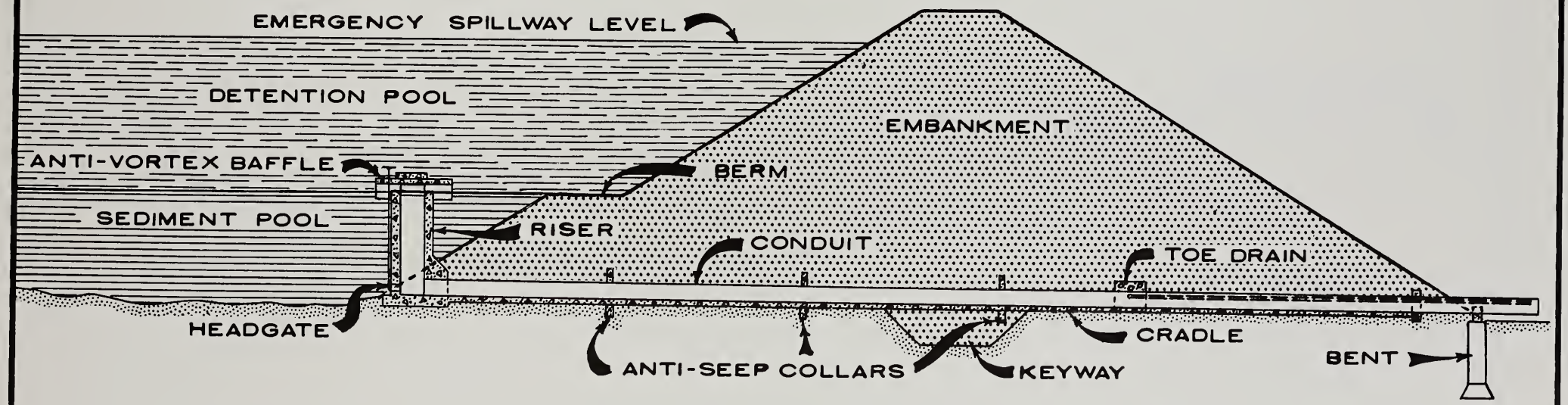
A preliminary field reconnaissance was made of the entire watershed by the Soil Conservation Service biologist with assistance from the work unit conservationist. Specific areas and conditions for further investigations were selected. Joint studies by biologists from the Fish and Game Commission and U. S. Fish and Wildlife Service and Soil Conservation Service followed. Field work included walking over much of the hardwood bottomland along the Tuscumbia River north of U. S. Highway 72 and observing timber stand composition, degree of flooding and presence of wildlife. Local residents were interviewed to determine the hunting and fishing success, species of game and fish, and accessibility

Fish population studies were made in Tuscumbia River and one of the natural lakes. This was done by measuring a one-half acre block in the lake and river and killing all the fish in this area with rotenone. These fish were picked up, sorted by species, separated by size and weights and an average poundage per acre determined for each species for the lakes and the Tuscumbia River.

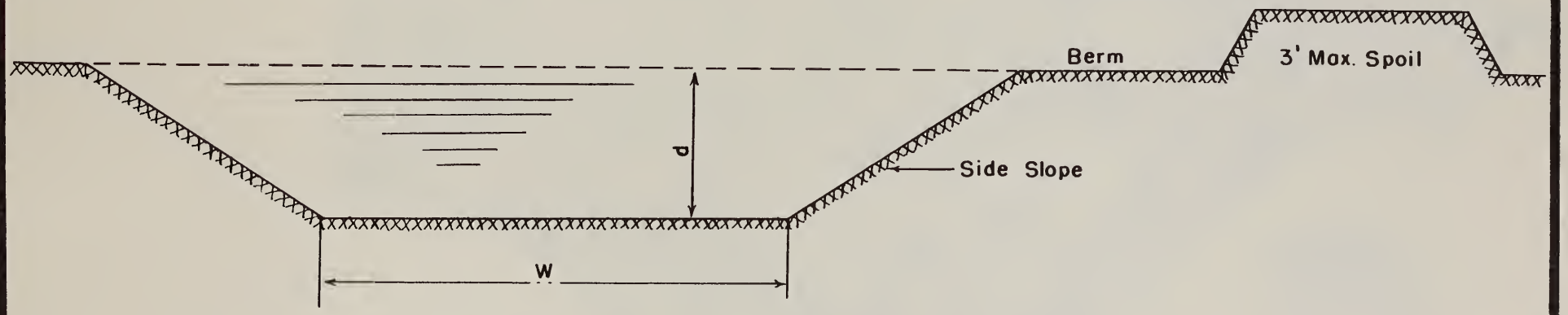
Based on research from previous studies, a determination was made of the extent of damage that would occur to fish and game from the works of improvement planned in the watershed. Mitigation measures were planned by this group of biologists based on engineering data already assembled by the Planning Party and with the field assistance of an engineer from the Watershed Planning Staff.

UNITED STATES
DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE
SPARTANBURG, SOUTH CAROLINA



SECTION OF A TYPICAL FLOODWATER RETARDING STRUCTURE



TYPICAL CROSS-SECTION TRAPEZOIDAL CHANNEL

FIGURE 32

AGR-SCS-SPARTANBURG, S C 1957 REPRINTED 1961

HATCHIE RIVER

TENN. STATE LINE

HARDEMAN COUNTY

SCOTT COUNTY

MCNAIRY COUNTY

ALCORN COUNTY

TENNESSEE

MISSISSIPPI

CORINTH

ALCORN COUNTY

PRENTISS COUNTY

BOONEVILLE

LEGEND

PAVED ROADS

IMPROVED ROADS

UNIMPROVED ROADS

FEDERAL HIGHWAY NUMBERS

STATE HIGHWAY NUMBERS

DRAINAGE

WATERSHED BOUNDARY

FLOOD PLAIN BOUNDARY

CRITICAL EROSION AREA (SHEET)

CRITICAL EROSION AREA (GULLY)

CRITICAL AREA ROAD BANK

RECONNAISSANCE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROBLEM LOCATION MAP

TUSCUMBIA RIVER WATERSHED

PORTIONS OF

ALCORN AND PRENTISS COUNTIES, MISS.
McNAIRY COUNTY, TENN.

TENTATIVE ROAD
MARCH 1940


DA 1660 AC
DA 2238 AC
DA 882 AC
DA 958 AC
DA 1,137 AC
DA 9,633 AC
DA 1,575 AC
DA 3,467 AC
DA 1,984 AC
DA 3,078 AC
DA 3,138 AC
DA 2,072 AC
DA 1,265 AC
DA 1077 AC
DA 1,208 AC
DA 2690 AC
DA 4,207 AC
DA 3,703 AC
DA 7,487 AC
DA 3,324 AC
DA 3,203 AC
DA 2,605 AC
CORINTH
BOONEVILLE
TENNESSEE
MISSISSIPPI
ALCORN COUNTY
PRENTISS COUNTY
McNAIRY COUNTY
HARDEMAN COUNTY
HATCHIE RIVER
LEGEND
PROJECT MEASURES
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PROJECT MAP
TUSCUMBIA RIVER WATERSHED
PORTIONS OF
ALCORN AND PRENTISS COUNTIES, MISS.
McNAIRY COUNTY, TENN.